On the Structure and mode of Growth of the Scales of Fishes.
By Dr. Salbey.

The author has made some investigations upon the structure of the skin in fishes which must lead to great modifications in our ideas, especially of the construction and growth of the scales.

Fishes are generally sticky to the touch—a phenomenon which M. L. Agassiz ascribed to a mucosity secreted by peculiar glands. Leydig, however, showed that no mucus-gland exists at the surface of a fish. The so-called mucosity is, in fact, only the most superficial layer of the epidermis. In the terrestrial Vertebrata the most superficial layers of the epidermis become hardened to form the *stratum corneum* which scales off at the surface. In fishes the superficial cells of the epidermis, instead of hardening, absorb water, become softer and softer, and constitute the mucous covering of the surface, which is easily removed. The corium, placed immediately beneath the epidermis, is formed essentially of two crossed systems of connective bundles. It contains numerous pouches, in each of which a scale is lodged.

It is well known that the ctenoid and cycloid scales present numerous concentric striæ, which M. Agassiz interpreted as the margins of superposed layers forming the scale. This opinion, which is still generally accepted, is, however, quite erroneous, as has been clearly shown by Dr. Salbey by means of vertical sections. The striæ are due to a series of irregular crests, which all belong to the superficial layer of the scale. The deeper and much thicker layer is formed by a series of superposed lamellæ of two substances. The thickest lamellæ are colourless and brilliant; the thinner ones are yellowish and but slightly transparent; the former are calcareous, the latter are composed of a sort of cement destitute of lime-salts. The calcareous lamellæ being generally thicker in old individuals than in the young, it is probable that their increase in thickness is caused by a gradual incrustation of the interposed layers of cement. The growth of the scale is explained by the fact, that a deposit of calcareous salts is formed periodically in the part of the corium which is directly applied against the lower surface of the scale. This incrusted layer becomes for a time the lowest lamina of the scale. Then a layer of cement is deposited between this calcareous lamina and the corium: this alternate formation of calcareous and non-calcareous layers is repeated a great many times.

Besides the concentric lines, the scales present striæ which radiate from the centre to the periphery. These are the "longitudinal canals" of Mandl, the "fan-like furrows" of M. Agassiz, and the "sutures" of M. Peters. The name proposed by M. Agassiz (*sillons en éventail*) is perhaps the best, inasmuch as the striæ certainly correspond to furrows of the surface. But from the bottom of these furrows true partitions of unincrusted cement start, which traverse the whole thickness of the scale and divide it into a certain number of segments. By their partial incrustation these rays of cement may assist in the widening of the scale. At the centre of the system

of concentric lines of the surface of the scale there is a region of peculiar appearance, which M. Agassiz designates the "centre of growth," and Mandl the "focus," by which he understands "focus of nutrition." M. Agassiz regards this region as the oldest portion of the scale, the layers of which have been worn away. As regards the first point, that of age, he is undoubtedly right; as regards the second, this is not the case. If the asperities are less prominent in this part of the scale, it is because they date from a period when the fish was smaller.—*Archiv für Anat. Phys. und wiss. Medizin*, 1868, p. 729; *Bibl. Univ.* November 15, 1869: *Bull. Sci.* pp. 276–278.

On the Anatomy of the Alcyonaria.

By MM. G. Pouchet and A. Myèvre.

The anatomical systems of most of the inferior animals have not even yet been clearly determined. The existence of distinct muscular elements in particular, long admitted upon the testimony of the movements which one sees executed by the animals, has only been demonstrated quite recently in the *Actiniæ* by M. Schwalbe. As to the Alcyonaria, M. C. Genth has indeed described the muscles of *Solenogorgia tubulosa*; but his description is very incomplete, and even it does not stand in any relation to what we have been able to make out of the muscles of two other Alcyonaria, *Alcyonium digitatum* and *A. palmatum*.

The muscular elements are pale fibres, soft during life, about 0·002 millim. in diameter when they are at the maximum of contraction, but usually much more slender. They are finely granular, without nuclei, and have distinct outlines. They may easily be isolated, at least in part of their length, which is variable. These muscular fibres are, by their appearance and size, very like those of the Nemertea. These fibres, in the Alcyonaria, are arranged sometimes in sheets, and sometimes in thicker or thinner bundles, which form true muscles, having sometimes very definite insertions, and needing to be described and named as so many primary organs.

1st. *Longitudinal Muscles.*—They are eight in number, and correspond to each of the mesenteroid laminæ, which they themselves assist to form. They extend from the peristome far into the cœnenchyma (*sarcosome* of M. Lacaze-Duthiers), which we find still very distinct upon the walls of the wide canal, which forms a continuation of the bodies of the polypes (*grossere Saft-Kanäle* of Kölliker).

2nd. This canal presents throughout, beneath the epithelium which lines it, a layer of circular or transverse fibres, covering and crossing at right angles the fibres of the longitudinal muscles lying against the substance of the cœnenchyma. These fibres, retaining their direction, give form to the mesenteroid laminæ; and they are to be found still, under the same conditions, even on the wall of the perigastric cavities.

3rd. *Sphincter.*—This muscle occupies the peristome. It is formed